Statement of Work For A Steerable Antenna

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1.0 Scope

The purpose of this Statement of Work (SOW) is for the acquisition and installation of a steerable tracking antenna system for the Radio Frequency and Telemetry Station (RFTS). The antenna will be utilized as part of the overall RFTS which is used to checkout, test, monitor, troubleshoot and provide launch support of spacecraft and launch vehicle radio frequency (RF) communication systems. The antenna is to be built to the attached specification.

2.0 General System Information

NASA Kennedy Space Center (KSC) is issuing a Request for Proposal (RFP) for the purpose of seeking sources for the acquisition, installation, documentation and testing of one (1) steerable tracking antenna system. The system includes all components necessary to meet the requirements identified in the attached specification. This shall include, but not be limited to, all equipment hardware such as antenna reflector and feed, antenna pedestal, azimuth/elevation motors, mounting hardware, control system, communications and power interfaces and software.

The antenna shall be capable of transmitting and receiving microwave signals. The operating frequencies are in the Upper L-Band and S-Band region of the electromagnetic spectrum, specifically, the 1700MHz to 2500MHz range. The antenna reflector size should be no more than eight (8) feet with a parabolic geometry.

The antenna shall be provided with a control system capable of operating the steering mechanisms and motors in either manual or automatic tracking modes. The control system will be located remotely from the antenna in Launch Control Center (LCC) room 2P12. This is the nominal operational configuration. LCC room 2P12 is a typical electronic equipment and operations control room. A single standard 19" electronics equipment rack is available to house the antenna control system. The communications infrastructure to allow for the remote operation of the antenna will be provided by the RFTS.

The antenna is to be installed on an existing platform structure located on the southeast corner of the LCC rooftop. The antenna platform already exists and has mounting locations ready for up to five (5) antenna installations. The antenna platform has been designed for the anticipated size and weights for these antennas. Although there is space available around each antenna mounting area, there is not much additional space for any large ancillary equipment such as equipment racks or storage. The platform has an existing lightning protection system in place. It consists of three (3) masts with a catenary wiring system integrated with the LCC facility lightning and electrical grounding systems. A mini-powerzone with circuit breakers is provided on the platform which provides power (120VAC, 20 and 30 Amp) at each antenna location. Figures 2 and Figure 3 provide images of the existing antenna platform.

Detail requirements are provided in the attached specification.

Figure 1 RFTS Control Room

Figure 2 LCC Rooftop Antenna Platform (Far View)

Figure 3 LCC Rooftop Antenna Platform (Near View)

3.0 Installation

The Vendor is required to perform the antenna and control system installation and configuration. All equipment, personnel, tools and accessories necessary for installation shall be furnished by the Vendor.

There are several areas where the Vendor will be required to coordinate with the NASA technical representative during antenna installation; as detailed Sections 3.1 and 3.2.

3.1 Rooftop Installation and Lifting Crane

Due to the size and weight of the antenna assembly and the rooftop location, it is expected that a crane will be required to lift and deliver the antenna system to its final location. The Vendor will be required to make whatever arrangements necessary to acquire the crane and is responsible for contacting and scheduling the equipment. The solicitation will require as part of their crane ordering process, that a lifting and safety plan which includes antenna installation be submitted as part of the request.`5 Example documents and plans required for the ordering process will be provided by the NASA technical representative prior to installation date.

3.2 Control System Installation

Initial installation and configuration of the antenna control system is to be provided by the Vendor. The NASA technical representative will make accommodations in the existing equipment racks and assist in the installation and cabling of the antenna control system. The Vendor will provide all the necessary hardware, cabling and connectors to install the equipment and to properly interface with any NASA attached equipment, i.e. communications equipment, etc.

The Vendor shall perform the initial control system configuration. This shall include setting all hardware switches, software parameters, and any “tuning” requirements for bringing the antenna system to a fully functioning,

operational and maintainable state. All equipment, devices, labor and accessories necessary for installation of the control system shall be furnished by the Vendor.

4.0 Test Requirements

A two (2) step process of testing is to be performed in the acquisition and installation of the antenna system. The Vendor is required to meet the stated requirements in the specifications with a properly operating product. The Vendor shall develop and write all test procedures and shall submit them to the NASA technical representative for review thirty (30) days prior to the start of testing. All procedures will be reviewed and approved by the NASA technical representative within ten (10) days of receipt.

4.1 Performance Test Procedure

The Vendor shall submit, for approval, a performance test procedure that will determine if the antenna system is ready for delivery. The performance test shall consist of exercising all functions of the antenna and control system as identified in the specification. The Vendor shall be responsible for all activity required, verifying the specifications are met, including personnel, test equipment and materials. All equipment, devices, labor and accessories necessary for testing shall be furnished by the Vendor. The results gathered during the performance test shall be provided to the NASA technical representative for review prior to delivery of the antenna system.

4.2 Acceptance Test Procedure

The Vendor shall submit, for approval, an acceptance test procedure that will be used by NASA in the final acceptance of the delivered antenna system. The Vendor shall be responsible for all activity required, verifying the specifications are met, including personnel, test equipment and materials. All equipment, devices, labor and accessories necessary for testing shall be furnished by the Vendor.

5.0 Responsibilities for Inspection

Unless otherwise specified in the contract or order, the Vendor is responsible for the performance of any pre-delivery inspections. The Vendor may use his own facilities or any commercial laboratory acceptable to the Government. The Government reserves the right to perform any of the inspections set forth in the attached specification where such inspections are deemed necessary to ensure supplies and services comply with prescribed requirements.

6.0 Warranties

The Vendor shall furnish factory warranties against defects in materials and/or workmanship on all equipment supplied. The warranty shall be effective for at least 1 year after acceptance of the system and shall contain provisions for on-call maintenance support.

7.0 Maintenance Plan

The Vendor shall provide a Maintenance Plan identifying all items in the antenna system that requires any type of maintenance to be performed by NASA. Maintenance shall be identified by type such as one time, and regular or periodic. The items requiring regular or periodic maintenance shall identify the schedule to be followed for these activities. The maintenance plan shall include identification of any procedures, parts, tooling, and equipment necessary to perform the maintenance procedures. In addition, the maintenance plan shall include a recommendation of what parts should be acquired for shelf spares and their associated costs.

8.0 Customer Support

During the warranty period, the Vendor shall provide a single point of contact for the the purpose of initiating a call for routine or emergency remedial maintenance. The Vendor shall also provide a customer support capability of providing assistance to the NASA technical representative, as required, for problem diagnosis and resolution.

9.0 Training

The Vendor shall propose a complete training program for up to four (4) personnel to be completed at KSC. The Vendor shall also propose a complete training program for any additional personnel as my be required by NASA. This training may be exercised at NASA's discretion.

All training shall be scheduled and completed upon receipt of the equipment and shall be conducted as appropriate to the project phases. The Vendor shall identify training/documentation needed for pre-installation, installation and post-installation activities. Material and courseware for the training shall be provided in the form of text, drawings, workbooks, test sheets, and outlines. All training material will be managed and retained by the NASA technical representative. The Vendor shall permit NASA to reproduce the training material if necessary.

As a minimum, classes will be conducted on the following subjects:

a) Preventive maintenance.

b) Logic and hardware structure.

c) Diagrams and technical drawings.

d) Board level maintenance checkout.

e) Unit hardware maintenance.

f) Detailed drawings and system component identification.

g) System installation guides and facilities requirements.

h) Control system maintenance.

The maintenance training program shall equip the personnel with sufficient information to operate and maintain the antenna system equipment.

10.0 Documentation

Complete equipment documentation shall be provided upon receipt of the equipment. The documentation shall be submitted to the NASA Technical Representative identified in the contract delivery schedule. The documentation shall be of a technical nature intended for use by engineers, operators, and technicians responsible for installation, maintenance, and operations. Non-copyrighted documentation shall be made available to fully support the system. The documentation is to be provided in both a printed format and on CD or DVD ROM. The documentation delivered on disk is to be in a common data format capable of being read by widely used text processing software, specifically, Microsoft Word, Adobe Acrobat or HTML formats.

The documentation shall include:

a) A general description of the antenna and control systems equipment. This includes basic features, such as characteristics and specifications, along with a description of the general physical and functional make-up of the assembly.

b) A general description of the major functional elements.

c) A discussion of the theory of operation and major functional elements with supporting block and schematic diagrams. This includes descriptions of the mechanisms and circuits sufficient to allow understanding of their functional operations.

d) Interface data which includes connector and pin assignments, signal characteristics, and input/output interrelationships.

e) Software listings which include any special or custom drivers supplied with or firmware loaded onto the antenna system as well as any special or diagnostic software used in acceptance testing of the system.

f) Instructions for the operation and administration of the system including turn-on, warm-up, operational precautions, and shutdown. This includes any descriptions of functions accomplished by all manual and automatic controls, other modes of operation and precautions.

g) A complete command reference manual.

h) System troubleshooting and maintenance instructions including overall system alignment and minimum performance standards.

i) Instructions for performing preventive maintenance on the equipment including test equipment, requirements, step-by-step test procedures, and expected results.

j) Recommendations for corrective action if tests are unsatisfactory.

k) List of replaceable units and major functional items. The list shall include manufacturer's name, manufacturer's part number, reference designation for drawings and schematics, quantity used in the system, and any other information required for ordering replacement equipment.

11.0 Preparation For Delivery

The Vendor shall be responsible for preservation, packaging, and packing the antenna system and associated equipment; marking packages and containers; and shipping them to KSC. This section lists requirements for delivery of equipment and describes packing requirements.

12.0 Equipment

Preparation of equipment for delivery includes the preservation, packaging, and packing of items and the marking of packages and containers. The following requirements apply:

a) Maintain Reliability. The preservation, packaging, and container designs shall maintain the established reliability levels of the items being packaged.

b) Retention of Reliability. The preservation, packaging, and container designs shall retain the reliability of the item during storage, transportation, and handling.

13.0 Packing

a) Common Carrier. The items shall be packed in containers that ensure acceptance by common carrier and safe delivery to the destination.

b) Shipping Containers. The shipping containers shall comply with the Department of Transportation (DOT) common carrier rules and regulations, as applicable to the mode of transportation, and may be the Vendor's commercial practice when such practices meet these requirements.

14.0 Period of Performance

TheA period of performance shall be within four months from effective contract award date.of four (4) months is desired. The period of performance shall begin upon award of contract and shall include all project and design formulation through to final acceptance inspections to the BuyerNASA. The Vendor is to provide a written statement of acceptance and completion. Acknowledgement of both parties by their signatures to this document constitutes completion and acceptance by NASA.

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